

Inductive dielectric analyzer

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Abstract

© 2017 IOP Publishing Ltd. One of the approaches to bypass the problem of electrode polarization in dielectric measurements is the free electrode method. The advantage of this technique is that, the probing electric field in the material is not supplied by contact electrodes, but rather by electromagnetic induction. We have designed an inductive dielectric analyzer based on a sensor comprising two concentric toroidal coils. In this work, we present an analytic derivation of the relationship between the impedance measured by the sensor and the complex dielectric permittivity of the sample. The obtained relationship was successfully employed to measure the dielectric permittivity and conductivity of various alcohols and aqueous salt solutions.

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Keywords

conductivity, dielectric permittivity, electrode polarization, electromagnetic induction, sensor system, spectrometer

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